



Preface

There have been three significant milestones in the history of observational astronomy: the invention of the telescope, photography, and the spectroscope. The development of the spectroscope has contributed more to the science than any other telescope accessory. It has been said that 85% of all astronomical discoveries have been made with the spectroscope.

Probably due to the perception that lots of mathematics and calculations are involved, plus the fact that it doesn't have the "Ohh" or "Ahh" impact of some of the spectacular astronomical images now being regularly distributed on the forums and websites, spectroscopy is an area that has been long overlooked and neglected by the amateur. By using amateur telescopes, mountings, and CCD cameras currently available, this book will show how, with the addition of a simple spectroscope we can observe and record spectra that reveal the temperature, composition, and age of stars, the nature of the glowing gases in nebulae, and even the existence of other exoplanets circling around distant stars.

The basic challenge facing the novice is where to start. What equipment will I need? Where can I find a spectroscope? How do I process the CCD image? How do I analyze my first spectrum? These questions and more are addressed in this book. Up to date information on equipment, spectroscopes, and methods available to the amateur, and more importantly "How to. . ." are all included in this book.

There are three basic sections in this book:

1. Introduction to Spectroscopy. This part provides a brief overview of the history of spectroscopy, the theory behind the spectrum lines, and types of spectroscopes.
2. Obtaining and Analyzing Spectra. Tells how to set up and use your spectroscope; describes different commercially available spectroscopes, cameras, and CCD's; explains how to analyze your spectra; and presents some interesting amateur projects.

3. Spectroscope Design and Construction. Here you will find basic spectroscope design ideas and how to construct your own spectroscope.

Each section is independent of the other, so if you want to jump straight into taking your first spectrum, go to the second section and get started!

“Spectroscope” is the generic term for visual spectroscopes, spectrographs (imaging), and spectrometers (linear CCD measuring devices). (Telescopes are not given different names when used with eyepieces, cameras, or filters, so why should spectroscopes?!)

Units of measure are always an issue of debate. Both the SI unit nanometer (nm) and Angstrom units ($\text{\AA}$) are widely used in spectroscopy as a measure of wavelength, as are measurements and sizes in millimeters rather than inches.

As you gain practice and experience you may want to increase the resolution of your spectroscope, contribute to the ever-growing list of amateur and pro-am projects, or even construct your own spectroscope. The various sections in this book will guide you through the issues and hopefully answer your questions on all the different aspects of spectroscopy. It’s a new and challenging field for amateurs, and with even the most basic of equipment it can be interesting, thought provoking, and most of all fun!

Cobham, UK
February 2010

Ken M. Harrison

Astronomical Spectroscopy for Amateurs

Harrison, K.M.

2011, XIV, 242 p. 193 illus., 35 illus. in color. With online files/update., Softcover

ISBN: 978-1-4419-7238-5